

In re application: Hwang *et al.*
Filed: 07/26/2001
Response Dated 12/15/2004

PAGE 2 OF 5

Serial No.: 09/917,068
Atty. Dkt. No. PAT030
Reply to final Office action of 06/17/2004

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-10. (canceled)

11. (currently amended) A VCSEL comprising:
a substrate having a back surface and a front surface;
a first reflector disposed on the front surface of the substrate;
an active region disposed on the first reflector; and
a second reflector disposed on the active region such that the active region is interposed between the first reflector and the second reflector, wherein the back surface of the substrate comprises anti-reflection periodic row reflection means for reducing specular reflection of light into the active region.

12. (currently amended) The VCSEL of claim 11, wherein the anti-reflection periodic row reflection means comprise anti-reflection row means rows having a triangular cross section.

13. (currently amended) The VCSEL of claim 11, wherein the anti-reflection features periodic row reflection means are etched on the back surface using a selective wet etching solution.

14-15. (canceled)

16. (currently amended) The VCSEL of claim 11, wherein the anti-reflection features periodic row reflection means are etched on the back surface by photoelectrochemical etching.

17. (currently amended) The VCSEL of claim 16, wherein the anti-reflection features periodic row reflection means are etched on the back surface by scanning the back surface with a line-focused laser.

18-19 (canceled)

20. (currently amended) An array of VCSELs sharing a common substrate, each VCSEL comprising:
a substrate having a back surface and a front surface;
a first reflector disposed on the front surface of the substrate;
an active region disposed on the first reflector; and
a second reflector disposed on the active region such that the active region is interposed between the first reflector and the second reflector, wherein the back surface of the substrate comprises anti-reflection periodic row reflection means for reducing specular reflection of light into the active region of each VCSEL.

21. (currently amended) The array of claim 20, wherein the anti-reflection periodic row reflection means comprise anti-reflection row means rows having a triangular cross section.

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PAGE 3 OF 5

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22-36. (canceled)

37. (new) The VCSEL of claim 12, wherein the triangular cross section of the rows of the periodic row reflection means is such that light directed onto the period row reflection means from the active region is reflected away from the active region.

39. (new) The VCSEL of claim 11, wherein the periodic row reflection means comprise rows having a sinusoidal cross section.

40. (new) The VCSEL of claim 11, wherein the periodic row reflection means cause a diffuse reflection of light impinging on said period row reflection means from the active region.

41. (new) The VCSEL of claim 11, wherein the periodic row reflection means cause a specular reflection of light impinging on said period row reflection means from the active region which specular reflection of light is directed away from said active region.

42. (new) The VCSEL of claim 21, wherein the triangular cross section of the rows of the periodic row reflection means is such that light directed onto the period row reflection means from the active region is reflected away from the active region.

43. (new) The VCSEL of claim 20, wherein the periodic row reflection means comprise rows having a sinusoidal cross section.

44. (new) The VCSEL of claim 20, wherein the periodic row reflection means are etched on the back surface using a selective wet etching solution.

45. (new) The VCSEL of claim 20, wherein the periodic row reflection means are etched on the back surface by photoelectrochemical etching.

46. (new) The VCSEL of claim 45, wherein the periodic row reflection means are etched on the back surface by scanning the back surface with a line-focused laser.

47. (new) The VCSEL of claim 11, wherein the periodic row reflection means cause a diffuse reflection of light impinging on said period row reflection means from the active region.

48. (new) The VCSEL of claim 11, wherein the periodic row reflection means cause a specular reflection of light impinging on said period row reflection means from the active region which specular reflection of light is directed away from said active region.